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MAY 16, 1946

Town Meeting



BULLETIN OF AMERICA'S TOWN MEETING OF THE AIR

BROADCAST BY STATIONS OF THE AMERICAN BROADCASTING CO.



Science -- Salvation or Destroyer of Mankind?

Moderator, GEORGE V. DENNY, JR.

Speakers

HAROLD C. UREY
WILLIAM L. LAURENCE

SELMAN A. WAKSMAN
HERMAN N. BUNDESEN

(See also page 12)

COMING

—May 23, 1946—

Are Church Creeds Essential to a Religious Life?

—May 30, 1946—

**Are We Moving Toward a Government
Controlled Economy?**

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BULLETIN OF AMERICA'S TOWN MEETING OF THE AIR

GEORGE V. DENNY, JR., MODERATOR



MAY 16, 1946

VOL. 12, No. 3

Science: Salvation or Destroyer of Mankind?

Announcer:

Welcome, friends, to the 422nd broadcast of America's Town Meeting convening tonight in Pittsburgh, Pennsylvania, in the Syria Mosque Auditorium where we are the guests of the George Westinghouse Centennial Forum on Science. Leading scientists from all parts of the country are here in Pittsburgh for a three-day session considering the recent momentous events in the field of science.

To conduct our meeting, here is the general leader of America's most popular radio forum, Mr. George V. Denny, Jr., president of Town Hall, New York. Mr. George Denny. (*Applause.*)

Moderator Denny:

Good evening, neighbors. We're very glad indeed to be a part of this fine occasion honoring the name of George Westinghouse who was born a hundred years ago this year. Gathered here tonight

are the greatest names in science. We always seem to have significant and exciting meetings here in Pittsburgh. Remember when we discussed the fourth term for president here?

Tonight we are asking the scientists if there is going to be a fourth term for mankind and I hope you'll mark well every word they tell you and then try to read between the lines and try to understand fully what they are saying to us on this momentous subject, "Science—Salvation or Destroyer of Mankind?"

Nothing that I can say will be half as important as what they'll say. I can only remind you that this is not a debate but a discussion by four renowned authorities about a subject which concerns your very existence. They're not going to talk over your heads and they are not going to talk down. They are going to give it to you straight from the shoulder.

So listen first, my friends, to what Harold C. Urey has to tell you. Dr. Urey is one of the scientists who helped develop the atomic bomb. He is professor of chemistry at the University of Chicago and is a Nobel Prize winner for his discovery of heavy water. Ladies and gentlemen, Dr. Harold C. Urey. (*Applause.*)

Dr. Urey:

Strictly speaking, Mr. Denny, science can neither save nor destroy mankind for it is concerned neither with useful things nor with destructive things. What concerns us tonight is what men do with their knowledge and their skill of all kinds.

Science is an intellectual pursuit and has for its objective the understanding and exact description of natural phenomena of all kinds. But what shall we do with this knowledge? Use it to build material and spiritual things or use it to destroy man and his works?

I shall let Dr. Bundesen and Dr. Waksman discuss ways in which science has saved mankind and will save mankind in the future *if*—and this is the cue to my place on this program.

I could also tell of the great benefits physical science has brought to man, but I am the apostle of doom. I am still a frightened man and I wish you to be frightened.

The gravity of the present situation in the world is frightening

beyond our ability to express. It is not possible to exaggerate this situation. All positive benefits to come from science or anything else depend on the solution of the problem of war and particularly of World War III.

What we are discussing is not a scientific problem. It is a political and social problem. During this century, we have learned much about these technical applications of science, together with methods of mass production, which have developed with the aid of our large accumulations of capital, to produce materials for the use of men on a scale that has never occurred at any place or at any time in all previous history. With the aid of these things we can give man a material and intellectual existence on a level that has never before been known.

All of us, I think, recognize the truth of this statement as others on this program will tell you later.

At the same time, we have applied these same scientific and engineering methods to mass warfare, particularly in this century. This application has been so effective that we have brought this civilization to the very brink of a precipice.

We have reached such a state of development in the arts of war that it is possible that another war will destroy this civilization just as many previous civilizations have been destroyed in other ways. Such

previous civilizations have risen and fallen and the people within them lacked the capacity to prevent their destruction.

We may well pause and ask the question as to whether we, the people of the European civilization, have the capacity to prevent our own activities from destroying ourselves and all the great works of the mind that we have developed.

But in spite of my fears, I am not without hope. All of us who are descended from the Northern European tribes, and there are few of us whose ancestors did not come partly from that region of the earth, must recognize that 1,500 years ago our ancestors were savages on the northern plains of Europe, who did not leave a history of their own or even a carved monument of any kind to tell us of their mode of life.

During these 1,500 years, we have been able to adopt a civilization from the Mediterranean region and modify it to our uses. We have attained a very high intellectual level. That savage on the northern plains of Europe had the capacity to organize such governments as that of the United States and to build all the marvelous structures that we see about us.

It is my belief that the capacity of this man is still sufficiently great to master the new problems as they come to us.

It is my belief that we will be able to control the atomic bomb and other methods and weapons of war and prevent these destructive instruments from destroying us and all our works. But control of the atomic bomb and other methods of modern war will not come about if we adopt a purely passive attitude toward these things.

If we allow ourselves to drift, another war is inevitable and that war will exceed any wars of the past in destructiveness. It is necessary for us to meet this problem in some constructive manner and we must move rapidly.

We have about five years to work out methods for the control of atomic bombs in modern war. If we do not do this, control will be established by the victor in World War III—and we may not be that victor.

Every means of any kind that anyone can devise should be used to prevent war or postpone the outbreak of war and thus give time for the peoples of the world to adjust themselves to the atomic age. Mr. Laurence has some remarks on this subject later.

I am convinced that before the year 2000 a world government will be established on the earth. It will be a government, we hope, with limited powers, but that it will be established is not a point to be argued. The question is, will it be established by agree-

ment or will it be established by means of World War III. That war, if it is fought, will be frankly for the purpose of determining which group will organize government on a world-wide basis.

We cannot expect that such a social change as this will come about in a constructive way unless we—all of us—give it first attention among all the problems that face us in the Twentieth Century. (*Applause.*)

Moderator Denny:

Thank you, Dr. Urey. Now we turn to another department in the field of science — that invisible world of microbiology, which has so profoundly affected the destiny of man without his knowing it for thousands of years. Listen to the man whose research has opened new doors and windows in this invisible world—an eminent microbiologist, the discoverer of streptomycin, the professor of microbiology at Rutgers University, Dr. Selman A. Waksman. Dr. Waksman. (*Applause.*)

Dr. Waksman:

Dr. Urey has painted a very dramatic picture of what might happen to us if we do not learn to control the atomic bomb. My good friend and colleague, Mr. George Merck, told us this morning of the potential dangers of biological warfare. My own particular field, as Mr. Denny has said, is microbiology, which is the

study of microscopic forms of life, largely invisible to the naked eye. While I do not belittle the potentialities envisioned by Mr. Merck, I believe that actualities are much less dangerous than at first appears.

There are good microbes and bad microbes and I want to talk to you about the good microbes and their possible effect in controlling the bad ones.

Day by day, year by year, men of science are probing deeper into the mysteries of nature and learning more and more about how to use the great power available to us through the efforts of the scientists—the power that is found in the soil under our feet, in the water of our lakes, rivers, and seas, and in the very air that we breathe.

If you could join me in my laboratory tonight, I could show you through my microscope a whole new world consisting of bacteria, fungi, protozoa, and other fine forms of plant and animal life as well as the viruses which are not visible even through the ordinary microscope. These microbes affect our welfare in numerous ways, some being highly beneficial and others injurious.

There was a time when this unseen and mysterious world around us gave rise to pestilence, to plagues and epidemics that influenced history in far greater and in more important ways than the mightiest struggles between armies

on our battlefields. The outbreaks of smallpox, influenza, the black plague, and cholera have profoundly affected human history. Typhoid and yellow fever, diphtheria, typhus, and the various venereal diseases, once the scourges of mankind, can now be conquered by men of science who know how to control them.

By now, most of you have heard of penicillin and of streptomycin. These are new tools discovered by man for treating many diseases and are products of the microbes, themselves — the good microbes.

The scientists have a ten-dollar word for these chemical agents from which the beneficial microbes have been harnessed or domesticated — antibiotics — which simply means products of microbes that are able to destroy other microbes. These, together with the sulphadiazines, the vaccines, the serums, serve to eradicate further the dangers from human infection and epidemics.

Now let us look at the war. Can microbes be used as a weapon in warfare?

This has been suggested on several occasions—by inoculating the water with typhoid, with dysentery, or with cholera germs; by infecting the atmosphere with a variety of viruses and other disease-producing agents and the wild and domesticated animals with plague or with acute and deadly infections. By spreading a variety of blights, de-

structive insects, and fungi over crop areas, it would be possible that bacteriological saboteurs could ravage large sections of the country and cause inestimable damage to human health and welfare.

The equipment required for this purpose could be carried in small containers or the infective agents dropped from planes. The troops of the terrifying Spanish conqueror Pizarro are said to have presented the Indians with clothes from smallpox-infected patients, resulting in the death of three million Indians.

Various rumors reached us during the war that has just ended, that the Japanese actually used plague and cholera germs to infect rats and other wild animals in order to spread diseases among the Chinese.

Fortunately, however, the danger envisaged is far greater in theory than in reality. As Dr. Bundesen will tell you, water treatment, commonly practiced in our cities, methods of sanitation, and means of prevention of infection and epidemics now available would tend to eliminate most, if not all, of these potential dangers.

Man is now well willed to combat and control injurious microbes that may be willfully imposed by his fellowman. The possibility of great danger from disease and epidemics is always with us.

The deadly microbes are not dead. They will always be with

us and become actual dangers when given a chance, willfully or through sheer ignorance. With the help of science, man has learned to control them, to combat them, and to confine them to the laboratory test tubes where they can be carefully watched over by the microbiologists.

If they are ever taken out of the laboratory and used as weapons, as destroyers of mankind, this will be the work of governments—not of scientists—and let us pray that it will never happen. But if it does happen, the scientist is prepared—if given a chance—to meet this dangerous world and try to find weapons to combat these new potential dangers. (*Applause.*)

Moderator Denny:

Thank you, Dr. Waksman. Now, my friends and neighbors, listen to the counsel of a man whom the War Department chose to witness and explain the development of the atomic bomb to the world at large—Mr. William L. Laurence, science writer for the *New York Times* who has just won a Pulitzer prize for his work in this field. Mr. Laurence. (*Applause.*)

Mr. Laurence:

On July 1 this year there will take place on Bikini Atoll in the Marshall Islands the first test on the effect of the atomic bomb on ships. The test and the two tests to follow are appropriately named Operations Crossroads. For it is

true in every sense of the word that civilization, as we know it, stands at a crossroad, and that mankind is now faced with the most momentous decision in its history on this planet.

Like Hamlet, mankind as a whole, or at least that part of it rightly or wrongly named "civilized," is now faced with the question "to be, or not to be."

I agree with you, Dr. Urey, that the next five years, maybe the next five months, or less, may give the answer.

It all depends on what man decides as to the future of the atom. If he is going to use it for bombs, the answer is definitely "No." If he decides to use the vast power within the nucleus of the atom for his benefit, then the answer is a resounding "Yes."

Whether science is to be the salvation or destroyer of mankind depends not upon science but, as Dr. Urey says, on politics. It all depends on the question of war and peace. The word "war" has now become synonymous with suicide. The word "peace" is now a synonym for survival.

We are now witnessing a race against time between the forces that work toward the salvation of mankind through science and the forces that work toward its destruction.

In the past, we had time to catch up. We could let ourselves remain defenseless until the last min-

ute, content to wait until we were in danger and then we could mobilize all our forces.

What the atomic bomb has done is to kill time as well as cities and men. If there is to be a World War III, there will be no time to build ships and tanks and guns and planes, because in an atomic bomb war, it would be a matter of seconds and minutes or hours, and it would all be over.

On the other hand, if the decision is for peace, man has it within his power to realize the dream of the ages. After a million years of existence on this earth, he has at last managed to find the key that unlocks the basic energy of the cosmos, the vast treasure house within the nucleus of the atom.

He has the means to remold his world into a land of abundance and plenty for all; a world in which war would be unthinkable, provided he does not in the meantime destroy himself.

From time immemorial man has sought for means to conquer time and space. Atomic energy promises to bring him much closer to the fulfillment of this ancient quest, for he now has at his disposal a tool that can serve both, as the long sought for philosophers' stone, to create new elements more valuable by far than any gold, and as the equally legendary elixir of life for the conquest of disease and the prolongation of life beyond his allotted life span.

The modern name for this philosophers' stone and the elixir of life is *neutron*. It is the fundamental neutral particle of matter residing within the nucleus of the atom.

It would take a long time to bring about the beneficial use of atomic energy for mankind if man chooses, but the means are here today and a start can be made immediately, provided the proper measures are taken to utilize what we already have.

Right now we have three great atomic energy plants. These plants are now producing material for atomic bombs. They are also liberating vast amounts of atomic energy that is now going to waste.

In addition to liberating this vast amount of energy, these plants also liberate vast streams of neutrons. Scientists all over the country stand ready and waiting to use these neutron streams for the creation of new elements that could be used as powerful searchlights into the unknown, and as immensely valuable new substances for fighting disease. Yet for the present very little is being done.

Until Congress decides on a policy as to what to do for the peaceful development of atomic energy, present authorities are helpless. Congress is waiting for the people to tell them what to do. It is up to all of us to let Congress know just what our wishes are in this matter.

I agree with Dr. Urey that a world government is the eventual solution of the problem of war and peace. But I also feel that a world government would take too long a time before we could prevent another war which would mean an atomic bomb war.

Therefore, I think that along with a long-range plan for a world government, we should also have a short-range plan for the control of atomic energy in the interim period, while we are preparing for the desired goal. Thank you. (*Applause.*)

Moderator Denny:

Thank you, Mr. Laurence. Now, let us hear from a man who has devoted his life to the prolonging of the life of others, the Health Commissioner of our country's second largest city, Chicago, syndicated columnist, and health editor of the *Ladies' Home Journal*, Dr. Herman N. Bundesen. Dr. Bundesen. (*Applause.*)

Dr. Bundesen:

Thank you, Mr. Denny. Mr. Laurence, I agree with you that if civilization is to endure, atomic energy must be harnessed in the service of mankind.

I am in complete accord with Dr. Waksman's views that the scientist, if given a chance, can and will control the deadly microbe, and the most hopeful thing about science is that it shows itself as the two-edged sword that it truly is.

And, Dr. Urey, I'm so glad that you have emphasized the fact that we no longer live in the fool's paradise of belief that the mere progress of science, unbridled, will bring salvation to mankind.

The atom bomb has proved that it can wipe out millions instantly. But against this science so dark with power to destroy us utterly there is another science bright with the gleam of promise to forge a stronger and happier humanity.

My own life has been devoted to helping those who are sharpening this bright edge of the science against misery and death. Forty years in this battle have brought me deep faith that if we tell all of the people of the world of this beneficent science, showing them the good life that it can bring, this cleansing beam of universal knowledge will guide them toward control of the evil science, the one that at present seems to be the more powerful.

The need to start this good war is desperately urgent. Yes, Dr. Urey, if we dally for five years, or even for one year, it may be too late. But admitting that our backs are to the wall, how, then, can we begin the use of science against mankind's destruction and for his salvation?

First, by facing the fact that our lawmakers have been generous in support of the evil edge of the sword of science, but niggardly in the aid of the science that will

light our way out of world-wide hunger, and sickness, and misery, and death.

Take the development of the atom bomb. In six years, two thousand million dollars were gambled to make a reality of the most horrible instrument of destruction in all the history of the world. No sum ever faintly comparable has in a lifetime ever been devoted to the development of weapons to fight for life. It's the soldier, not the doctor, who had the ear of the rulers until now.

I'm not charging our leaders and power with malevolence. They doubtless believed they had to fight fire with fire. But, again, we must face a fact—it's that our rulers don't know, and don't know they don't know the search toward life and brotherhood that would follow if only they would give our scientists full use of the weapons, already available, to wipe out diseases that are now killing needlessly myriads, and to unravel the causes of the greed and the mass insanity that give rise to wars.

In my own time and experience, I've seen deathlike typhoid and diphtheria all but conquered. I've seen the dying of mothers and little babies in childbirth cut down far below what used to be considered the irreducible minimum.

But these are only partial triumphs. So powerful has life science become in these various years, when we thought death

science was invincible, that it is not too much to say that an essentially disease-free mankind is now in sight. If bombs can destroy whole cities, we can wipe out whole deaths from the face of the world—and I don't mean maybe.

Again, out of my own experience in the city of Chicago, one-tenth the sum devoted to the development of the atom bomb would go a long way toward wiping out the curse of venereal diseases from our Nation. Similarly, modest expenditures would make tuberculosis, pneumonia, and the other master killers hardly more than evil memories, and what a world that will be.

Weapons are already at hand to save one-third of the 160,000 who needlessly perish from cancer every year. Only the other day a fine young scientist showed me how we could wipe out rheumatic heart disease, very likely within ten years. Organic chemists are giving us new vitamins and hormones, promising control of the degenerative diseases of the arteries and prolongation of the prime of life.

Why don't we follow through and learn more about this? It is only a beautiful dream. Is it because it's too expensive. The answer is—it costs far more to die than it does to live! (*Applause.*)

Moderator Denny:

Thank you, Dr. Bundesen. Now, gentlemen, I don't know whether you've stirred up enough difference

THE SPEAKERS' COLUMN

HERMAN NIELS BUNDESEN—Health Commissioner of Chicago, and a syndicated columnist, Dr. Herman Bundesen is also health editor of *Ladies' Home Journal*. Born in Berlin, Germany, in 1882, Dr. Bundesen was brought to this country in infancy. He has an M.D. and an honorary Sc.D. from Northwestern University and an M.D. degree from U. S. Army Medical School at Washington, D.C.

In 1909, he began his practice of medicine in Chicago. From 1914 to 1922, he was epidemiologist for the Chicago Department of Health and since 1915 he has been epidemiologist for the Illinois Central Railroad. He is regional consultant on contagious diseases for the U. S. Veterans Bureau.

Dr. Bundesen has been health commissioner of Chicago (1922-27); director of health for the Sanitary District of Chicago (1927-28); coroner of Cook County, Illinois (1928-31); and president of the Chicago Board of Health (since 1931). Since 1926, he has also been a lecturer at the University of Chicago. He is a member of numerous health and welfare organizations. In 1926, he was awarded the *Chicago Daily News* prize of \$1,000 "for the most beneficial action for humanity by a resident of Greater Chicago."

WILLIAM LEONARD LAURENCE—Winner of a Pulitzer Prize for his eye-witness account of the atom-bombing of Nagasaki, William L. Laurence of the *New York Times*, is one of the most popular writers on scientific subjects of the present day. He came to the United States from his native land Lithuania, in 1905, and became a naturalized citizen in 1913.

Mr. Laurence is a graduate of Harvard and has also studied at the University of Besancon, France. For several years he was an instructor and tutor in Cambridge, Massachusetts. From 1921 to 1926, he was a free-lance writer and play adapter. In 1926, he joined the staff of the *New York World*, and from 1927 to 1930 he was associate aviation editor. Since 1930 he has been a science news reporter for the *New York Times*.

During World War I, Mr. Laurence served with the A.E.F. He has received

many awards and citations for his writing in the field of science. He is also the author of several plays and many magazine articles. He recently finished a book on the atom.

SELMAN ABRAHAM WAKSMAN—Born in Priluka, Kiev, Russia, in 1898, Dr. Waksman came to the United States in 1910 and was naturalized in 1915. He has B.S., M.S., and honorary D.Sc. degrees from Rutgers University, and a Ph.D. from the University of California. After working as a research assistant in soil microbiology, as a research biochemist, and as a bacteriologist, he became a lecturer on soil microbiology at Rutgers in 1918. He was an associate professor there from 1924 to 1930, and has been a full professor since then. He has also been a microbiologist for the New Jersey Agricultural Experimentation Station at New Brunswick since 1921, and a marine bacteriologist at Woods Hole Oceanographic Institute since 1930.

About two years ago, Dr. Waksman, attempting to find a new drug which would cure diseases not cured by penicillin or the sulfa drugs, discovered the "wonder" drug, streptomycin.

HAROLD CLAYTON UREY—Dr. Urey is head of the Institute of Nuclear Research, University of Chicago, and one of the scientists who helped to develop the atomic bomb. He was born in Walkerton, Indiana, in 1893. He has a B.S. degree from the University of Montana, a Ph.D. from the University of California, D.Sc. from the University of Montana, Princeton University, and the University of Newark. Before his graduation from college, he taught several years in rural schools. From 1917 to 1919, he was a chemist with the Barrett Chemical Company in Philadelphia.

During his teaching career, he has been on the staffs of the University of Montana, Johns Hopkins University, and Columbia. He is the author (with A. E. Ruark) of *Atoms, Molecules, and Quanta* and of numerous articles for scientific journals. He has specialized in the structure of atoms and molecules and related subjects.

between you to have a discussion around the mike, or whether we'd better go into the audience for questions. Dr. Urey, do you think we've got some difference of opinion here? Would you like to ask a question of the others?

Dr. Urey: Dr. Waksman and Dr. Bundesen seem to think that the beneficial uses of science are sufficiently curative for the destructive effects of science. I should like to ask them what they think is the solution to this modern

technicological war. How are we going to prevent that destroying all the useful things of science while it destroys itself?

Mr. Denny: I think you were the man who carried the burden there, Dr. Bundesen. Perhaps you'd better comment.

Dr. Bundesen: Two thousand million dollars for instruments for the destruction of life! Let's spend the next two thousand million dollars for the development of weapons to fight for life! (*Applause.*)

Mr. Denny: Does that answer Dr. Urey's question, Mr. Laurence?

Mr. Laurence: I hardly think so. After all, we've all agreed with that, but how are we going to bring it about, Dr. Bundesen? That is the problem that confronts us all. We all would like to see that, of course. Tell us how.

Dr. Bundesen: We must expose these things to the cleansing light of universal knowledge. How did they get the two thousand million dollars against it? If we can do that same thing, let's get it for it. It was there. (*Applause.*)

Mr. Denny: Dr. Waksman, have you anything to add?

Dr. Waksman: My problem, as I mentioned, was biological warfare. Certainly, we must be protected. We must be prepared to defend ourselves against it. And in preparing so, no doubt the rest of us will benefit from their expenditures, but I truly agree with

Dr. Urey in the great dangers of the atomic warfare. (*Applause.*)

Mr. Denny: Dr. Urey.

Dr. Urey: You see, I think, this problem is not a scientific one. No expenditure of money in one way or the other for science will solve the problem. It is a political problem. The world is in anarchy. It can only be solved from anarchy by the establishment of law. One can only get law by having established governments. This is my answer to the problem of how will we prevent the atomic bomb, and many other things, from destroying us, and not bringing us the great benefits that we all desire. (*Applause.*)

Mr. Denny: Mr. Laurence?

Mr. Laurence: I would like to ask Dr. Urey whether or not he doesn't think that the danger of being destroyed by an atomic bomb within the next five or ten years is not greater than the chances of getting world government within that period.

Dr. Urey: I think the most likely course of history is that we will have an atomic bomb war. I would bet my money on that, if I thought it was worth while. Winning wouldn't be worth while. At the same time, the only solution for this problem is a limited world government. Perhaps it could be very limited. It is the only solution I know of. Probability low or high, I must work

for the only thing that looks like a solution to the problem. (*Applause.*)

Mr. Denny: Thank you, Dr. Urey. That seems to be a good place for us to pause briefly for station identification.

Announcer: You are listening to America's Town Meeting of the Air, originating tonight in the Syria Mosque Auditorium in Pittsburgh, Pennsylvania, where we're the guests of the George Westinghouse Centennial Forum on Science. Our topic is, "Science—Salvation or Destroyer of Mankind?" You have just heard from

Dr. Harold C. Urey, William L. Laurence, Dr. Selman A. Waksman, and Dr. Herman N. Bunsen, and they are about to take questions from the audience.

Let me remind you, friends, that copies of tonight's discussion, as well as all Town Meetings, are available in full, including questions and answers, in the Town Meeting Bulletin, published for your convenience for 10 cents. You may receive it regularly each week for a year for \$4.50, for 6 months at \$2.35, and for 11 weeks for \$1. Address your orders to Town Hall, New York 18, New York.

QUESTIONS, PLEASE!

Mr. Denny: Before we take our questions on this very important topic, may I take time to welcome the addition of the 184th station which joins our network tonight. It's Station WNCA, in my old home town of Asheville, North Carolina. We have been on the air for nearly 11 years now, and for the first time the moderator's home town can hear our program. We salute our friends in Asheville and wish WNCA long life and prosperity as an ABC affiliate. This at least, gentlemen, is one of the blessings of modern science.

Now, our speakers are ready to answer the questions of this fine representative audience here in Pittsburgh. Remember, to promote good questions, we are offering a \$25 United States Savings Bond for the question considered best in the opinion of our committee of judges for the purpose of bringing out facts and clarifying the discussion, provided the questions are limited to 25 words. We will start with the question from the lady in the nice-looking hat there.

Lady: Dr. Urey. Dr. Bundesen said that the atomic bomb cost two thousand million dollars. Will you make it clear that that was the amount spent for the development of the bomb; that the bomb did not cost that much; that the bomb

will save men and airplanes? Will you tell the audience how much is lost when a plane is shot down?

Dr. Urey: Yes, I can make a statement of that kind. Of course, the first atomic bombs cost us two billion dollars total, and we only dropped two in this war. You might think that was one billion dollars apiece. I don't know what an atomic bomb would cost in the course of years if we tried to get the cost production down low, but I should think a million, or two million dollars, somewhere in that neighborhood, would cover the cost. It's the cheapest explosive we have, considering the destruction it does.

Mr. Denny: Thank you. Dr. Bundesen, do you care to comment on that?

Dr. Bundesen: No.

Mr. Denny: Thank you. The gentleman there.

Man: I'd like to ask a question of Mr. Laurence. Is not the production of atomic energy, the finding, you might say, of God's own secret of the creation of His nature? Isn't this a terrible secret for a common man to have?

Mr. Laurence: Not at all, everything else is a part of God's own nature. There is no difference. (Applause.)

Man: I'd like to ask a question of Dr. Waksman. The war has been over for about a year. Now,

why is it then that the information on biological warfare has been kept such a dark secret until just this morning when Mr. Merck revealed it here before the George Westinghouse Centennial Forum here in Pittsburgh? Why has it been kept such a dark secret?

Mr. Denny: Better ask the Army. I don't know, but Dr. Waksman, would you comment?

Dr. Waksman: I will try to answer this question although I have not been concerned at all with either the development of biological warfare or with keeping it a secret. Biological systems work far slower than chemical reactions. There is no doubt that it took years to discover certain principles whereby chemical reaction can be worked out in much shorter period of time, and therefore in order to really answer the question, it may have taken that much time.

Mr. Denny: Thank you. The gentleman in the back row there.

Man: Dr. Bundesen. You seem to feel that the lawmakers of the world are responsible for our future salvation. What can we do to stir up our Congressmen in these United States?

Dr. Bundesen: I think sickness, misery, death, are all things that maintain themselves always on public ignorance and public indifference. I, too, think that when you expose these things, as you do in this fine forum here, to the

cleansing light of universal knowledge, conditions will be solved.

I am sure that if enough people show interest—if not now, at the next election time—for what they want, they'll get what they want. *(Applause.)*

Mr. Denny: Thank you. Gentleman in the balcony, please.

Man: Mr. Laurence. Knowing of the frequency of wars between nations, is science charged with this condition or are political ambitions of nations or factors within nations guilty?

Mr. Laurence: Well, that's a question that would be very difficult to answer, but whatever the causes of war we should try right now to eliminate them because war no longer will pay either the victor or the loser. There will be no victor in the next war, so whatever the cause, it would still be a non-paying proposition and by making that clear then it wouldn't matter what the causes are.

Mr. Denny: All right. Thank you, Mr. Laurence. Remember the Southerners—and being a Southerner I can say this—the Southerners used to say that we could have licked the Yankees with cornstalks but they wouldn't fight that way. *(Laughter.)* The gentleman on the back row of the second balcony. Let's see if we can get him up there.

Man: Dr. Urey. How do you propose raising a police force to support your world government?

Dr. Urey: The problem of securing international control of the atomic bomb and warfare involves, first of all, taking temporary measures as may be necessary, as Mr. Laurence says, to give us time. Then we must expect to establish a government that has executive, legislative, judicial powers. With the executive, of course, would go the usual police powers. Not an army—an army isn't a police force. It is distinctly different. A police force works within law, an Army works outside of law. It shall have to tax the population directly. It must make laws for individuals and not for states—you can't coerce a state except by war. These things take time. I think it is possible that we can obtain it without war, but maybe not.

Mr. Denny: Thank you, Dr. Urey. We're going to have one of those discussions on June 20, so let's save most of our questions for that. All right. The gentleman in the middle here.

Man: Question for Dr. Waksman. Do the military leaders of this country realize that biological warfare, perhaps, holds greater terror for mankind than atomic warfare? And if so, would anything be gained by conducting biological warfare tests on a scale that is comparable to Operation Crossroads?

Dr. Waksman: It is very difficult to compare the effectiveness of biological and atomic warfare. As a

matter of fact, atomic warfare has been tested and found to be highly destructive. Biological warfare has never been tested on any scale comparable to warfare at all. Small tests seem to indicate that it can be very dangerous and very destructive.

However, as I indicated in my presentation, the scientific workers — the scientists — have learned many methods of control of biological warfare, and given time, they will, no doubt, find ways of controlling the new ones. It takes time, and meanwhile, it can prove highly destructive.

Mr. Denny: Thank you. The gentleman down here, please.

Man: My question is directed to Mr. Laurence. I should like to ask you if you believe that science is the destroyer of mankind, would you therefore conclude that scientific research should cease or would you rather say that scientists should redouble their efforts to provide answers to world dissatisfaction that cause wars?

Mr. Laurence: I certainly would advocate the continuation of scientific research. I certainly don't believe that it would be possible even if it were decided to stop it because you can't stop the human mind from functioning. What I am saying merely is that science could save civilization, could bring about a millenium, provided doomsday is not brought about first by those who misuse science.

Mr. Denny: Yes. Dr. Urey?

Dr. Urey: I would just like to raise the question about stopping work on science. Do you mean just in the United States or do you mean also in the rest of the world? If you mean in the whole world, how do you propose to do it? (*Applause.*)

Mr. Denny: The young ensign—commander (*laughter*)—lieutenant junior grade.

Man: Dr. Urey. Do you not feel that the reasons that prompted nations not to use poison gas in this past war will also cause them to withhold the use of the atomic bomb although they may have it, in the future?

Dr. Urey: The answer is emphatically "No." I am doubtful in regard to the reasons for withholding poison gas, but I suspect that the reason was that it was not as effective as incendiary bombs. If the whole world has atomic bombs, we'll all become pathological. We will live in fear, night and day. We will not be rational. We will be highly irrational. Each one of us will think that we ought to start the atomic bomb war tonight before the other fellow starts it tonight. (*Applause.*)

Mr. Denny: Thank you. The gentleman up in the second balcony.

Man: Dr. Bundesen.

Mr. Denny: You're in the first balcony. I said second balcony. (*Laughter.*) The second balcony.

Man: Dr. Bundesen.

Mr. Denny: A little louder.

Man: Dr. Bundesen. As civilization contemplates the unspeakable horrors of the Axis concentration camps, do you not think it was a bargain that we won the war on two billion dollars?

Mr. Denny: Don't you think that it was a bargain that we won the war on two billion dollars?

Dr. Bundesen: I have no quarrel with the two billion dollars that was spent. All I say is let's also spend another two billion dollars to save humanity from the other diseases, that we can, that are available and ready to be controlled. I've no quarrel with the two billion dollars that was spent. That was all right, but let's spend equal amounts to take care of many of these preventable conditions that the discovery of the atomic bomb now is bringing forward as a solution of our problems. (*Applause.*)

Man: Dr. Urey. How are you and other scientists throughout the world striving for progress and survival when you use your talents for inventing bigger, better methods of destruction? (*Applause.*)

Dr. Urey: I was asked that question in Detroit and I asked if all the citizens of Detroit that helped to make tanks felt any sense of guilt because they did so. We're all caught in the web of war. None of us can keep out

of it when we once start a war.
(Applause.)

Mr. Denny: Thank you.

Lady: My question is directed to Dr. Waksman. Would putting the control of scientific findings in the hands of scientists in their respective fields not result in non-destructive application of the findings?

Dr. Waksman: The scientist never works with the purpose of destroying. He works for the purpose, first of all, for discovery and, secondly, hoping that his discovery will be for the good of man.
(Applause.)

Mr. Denny: Thank you. All right. The gentleman over there. The man in the blue suit.

Man: Mr. Laurence. Science can produce. Now it's largely up to us what we do with what science has given us. If we put as much effort in trying to win the peace as we did to win the war, can we not have a lasting peace and united world?

Mr. Laurence: I hope you're right. But we are not working very hard towards that aim, in my opinion.

Mr. Denny: Yes. That's what this program is all about. The gentleman down there.

Man: Dr. Bundesen. Don't you think that the two billion dollars spent for the atomic bomb could be used for—the energy could be also used for—medicine for your purposes, too?

Mr. Denny: Yes. Why not use atomic power for beneficial purposes instead of just for destructive purposes?

Dr. Bundesen: The scientists here that have talked to you can better answer that question and already have better answered that question. That is just exactly what we'd like to get the two billion dollars for—or whatever it takes.

Mr. Denny: The young man 'way up in the second balcony.

Man: Do you expect that the atom bomb could have been developed in the length of time had the war not been present? In other words, do you think that you would have gotten government help for expenditures of the development of atomic energy in peacetime?

Dr. Urey: No. No, not at all. I think it might have been much better—it might have been—of course, this "might have been" is a very unsatisfactory expression. Omit it. We only know what happened. But I don't think we would have gotten it for peacetime purposes.

Mr. Denny: That's what President Roosevelt used to call an "iffy" question. The fact is, we've got it. The front row balcony.

Man: Mr. Laurence. Consider history; science made tremendous strides in twenty centuries. Man's position with respect to salvation changed negligibly. Aren't we

over-estimating this tremendous danger of science?

Mr. Laurence: We are not at all. No, we have just reached a point where all the research and knowledge accumulated in the two thousand years—or rather ten thousand years or say even half a million years — we have now reached a point where we have liberated the force which has the power to destroy us in a very short time. Up to now, the forces of salvation, you might say, and the forces of destruction were about evenly balanced. In fact, until about 25 years ago, the beneficial forces were greater—were out-balancing the destructive forces.

But now the tables have turned. The destructive forces are way ahead, and will be unless something is done to check them, and it has to be done by all men living today, because it is everyone's problem. (*Applause.*)

Mr. Denny: Thank you, Mr. Laurence. The gentleman over here.

Man: Dr. Bundesen. Can science further advance the people's welfare while shackled by the artificial production controls and stifling patent restrictions?

Dr. Bundesen: Would you please repeat that? I didn't get it.

Man: Can science further advance the people's welfare while shackled by the artificial production controls and patent restrictions of private enterprise?

Mr. Denny: Oh, yes. Now we got it.

Dr. Bundesen: I don't think that anything ever can shackle science. It will go on and on and on, no matter what tries to hold it back. It may be retarded a little bit but sooner or later the true things will come up if you want them hard enough, and long enough, and strong enough. (*Applause.*)

Mr. Denny: Thank you. The gentleman in the back row.

Man: I would like to direct this question to Dr. Urey. Must scientists wait for word from Congress before they start adapting atomic energy to constructive uses in industry, health, and fuller living?

Dr. Urey: Such efforts are going on at the present time and a certain amount of effective work is being done. I do not think that we will attain the maximum development of atomic energy for either peacetime or military purposes until we get the legislation through Washington, that is now proposed, establishing a stable atomic energy commission which can set policies for a long period ahead and can move with confidence. (*Applause.*)

Mr. Denny: Thank you. The lady right down there.

Lady: Mr. Laurence. Will not quick revolution from capitalism which has ruled and (*words indistinguishable*)

Mr. Denny: A little louder, please. We can't hear you.

Lady—socialism which is built on the brotherhood of man and will create friendly condition, so that science will be the salvation of mankind?

Mr. Denny: Ah, there you are. That's the lady that asked the question in the opening meeting. Will communism bring a better set of circumstances so that we can have the brotherhood of man and use science for the benefit of all? I think that's the gist of her question.

Mr. Laurence: Well, I'm sorry I'm not a prophet. (*Laughter and applause.*)

Mr. Denny: Thank you. Now the gentleman over there.

Man: Dr. Bundesen. If our financial conditions control business conditions, and our business conditions control the temper of the people in the world and create wars, why don't we do something about that before we have to have atomic war?

Mr. Denny: Well, the gentleman wants to know why we don't do something about business conditions before we have an atomic war. (*Applause.*)

Dr. Bundesen: Long ago, I learned that if I didn't know, it was a good policy to say I didn't know, and the greatest difficulty is when you try to answer something that you don't know. So if you don't know, and you know you

don't know, then get somebody who does know, and you'll never get into trouble. (*Applause.*)

Mr. Denny: Thank you, Dr. Bundesen. I'm afraid we'll have difficulty finding anybody who would say that they knew the answer to that particular question. Now, this is not exactly a debate, and our speakers appear to agree on a number of points, so we have prepared a summary here on behalf of all of the speakers, and I give it to you as their spokesman:

The answer to tonight's question, "Will science save or destroy mankind?" lies not in the scientists, but with you, the people, and your governments all over the world.

The scientists are daily probing into the mysteries of nature and are finding means to both prolong and destroy life more effectively and more efficiently than ever before. Dr. Urey and Dr. Laurence have emphasized the tremendous urgency—we might say the terrifying necessity—for us to find political means of bringing atomic power under controlled world law. Dr. Waksman and Dr. Bundesen do not dispute the facts set forth by their colleagues, but they would have us look at the good edge of this two-edged sword and restrain the hand of those who would use the bad edge to destroy us.

Indeed, Dr. Waksman feels that while there may be no defense

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against the atomic bomb, there are defenses, either developed or potential, against biological warfare, and this, at least, is a hopeful sign.

With one accord, they say it's up to you, the people of America, and the people all over the world, and may I point out that if we are to find the right answers to these perplexing problems, we must use our minds with the same integrity that the scientist uses when he closes the door of his laboratory behind him.

We seek for universal truth in the realm of physical relations, as we must seek for universal truth and justice in the realm of human relations. We can no longer afford the luxuries of intolerance, prejudice, greed, and ruthless nationalism. We are living in a new world of science, and this two-edged sword is in our hands—yours and mine.

Now while thanking each of our speakers on your behalf for their extremely valuable contributions to our understanding of this vast question, may I express our appreciation to Mr. Lee Sellers and his associates of the George Westinghouse Centennial Forum on Science, and Station WCAE for their splendid cooperation?

Next week, and the following one, which will be the occasion of our 11th Anniversary, we have two extremely vital questions to discuss,

and here's our announcer to tell you about them.

Announcer: As an appropriate follow-up to our meeting this week on science, we turn next week to the subject of religion, when our program will originate in Columbia, Missouri, where we will be the guests of Stephens College.

Our subject will be, "Are Church Creeds Essential to a Religious Life?"

Our speakers will be Rabbi Ferdinand M. Isserman of the Temple Israel in St. Louis; Paul Weaver, head of the Department of Philosophy of Stephens College; Dr. Frank Clark Fry, president of the United Lutheran Church in America; and Father Francis J. O'Reilly, S.J., Professor of Philosophy of St. Louis University.

The following week, from Detroit, in the Masonic Temple Auditorium, we will bring you our 11th Anniversary program, presented in connection with the Golden Jubilee Celebration of the automobile industry. Our subject will be, "Are We Moving Toward a Government Controlled Economy?"

Our speakers will be Senator Homer Ferguson, Republican from Michigan; and Herman W. Steinkraus, president and chairman of the Board of the Bridgeport Brass Company, for the affirmative. A. A. Berle, lawyer, former Assistant Secretary of State, and Walter

Reuther, president of the United Automobile Workers, CIO, will speak for the negative.

Remember, copies of tonight's discussion, as well as all Town Meetings, are available in full, including questions and answers, in the Town Meeting Bulletin, published for your convenience for 10 cents. Just send your request to Town Hall, New York 18, New York.

Now, here's Mr. Denny, with

the decision of the judges on tonight's best question.

Mr. Denny: Tonight's best question, selected by our committee of judges, and awarded a \$25 United States Savings Bond, is, "Why has information on biological warfare been withheld from the public and kept a deep, dark, secret until today?"

If the man who asked the question will come forward he will get his \$25 War Bond.* Congratulations. (*Applause.*)

*William J. Beal, Pittsburgh, Pa.



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